The slave-making ant *Formica sanguinea* at Bennachie, Aberdeenshire

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### Introduction

Slave-making ants such as *Formica sanguinea* (Latr, 1798), exploit workers of other ant species to maintain their colonies (Mori et al, 2000) (Figure 1). Nearby nests of related species are raided and the host brood brought back to the parasitic nest where they are closed to produce slaves (Hölldobler & Wilson, 1990). The enslaved ants perform routine colony work, such as nest maintenance and brood care, alongside their slave-making counterparts. But while the foraging and raiding behaviour are well documented (e.g. Mori et al, 2000), there are many aspects of the ant’s ecology that are not well known. We report here the results of a preliminary investigation of *F. sanguinea* at Bennachie Forest in Aberdeenshire.

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### Distribution and status

*F. sanguinea* is the only Eurasian component of the *F. sanguinea* group of slave-making species. In the UK it has a disjunct distribution (Figure 3), occurring mainly in the central Highlands of Scotland and the south east of England. The colonies within Bennachie Forest, Aberdeenshire, were first recorded in 2008 and represent one of the most easterly populations of the ant in Scotland. Falk (1991) recorded *F. sanguinea* as nationally scarce. However, as the species is almost certainly under-recorded (Hughes, 2006), its true status and distribution are unknown. More recent survey work by the Highland Biological Recording Group has revealed the species is far from rare and in some cases locally abundant.

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### Habitat

In the central Highlands the ant is strongly associated with native pine forests. In Moray and Aberdeenshire the habitat tends to be plantation forest. A total of seven nests have been found at Bennachie to date (Table 1). Five of these are situated in clearings which have been felled at least five years previously. An additional two nests are alongside paths. The nests are all in moss-covered tree stumps or fallen logs and in relatively wet areas (Figure 4). Other habitat characteristics are typical of early successional woodland such as grass-dominated understorey vegetation and an open canopy with high numbers of young seedlings.

### Host species

In the UK, *F. sanguinea* enslaves ants of the genus *Formica*. It is mainly associated with *F. lemani* and *F. fusca* (Figure 5) although there is anecdotal evidence of *F. candida* and *F. fusca* being used as hosts. At Bennachie the host species *F. lemani* appears to be present in all *F. sanguinea* nests and is itself widespread and abundant throughout the forest.

### Conservation & management

The lack of knowledge about the distribution and status of this ant in the UK highlights the need for further surveying. Another gap in our knowledge is the extent to which *F. sanguinea* can disperse which may influence metapopulation dynamics. The provision of dead wood through natural tree deaths, windfalls or routine felling of mature trees is clearly important, in Bennachie Forest at least, in providing nesting habitat for this species. Selective felling of trees in native woodlands and the clearfell of commercial plantations may help maintain populations particularly where this habitat is adjacent to an existing population.

In general, deadwood is a declining but important resource within forests. The provision of suitable habitat for *F. sanguinea*, which could be easily incorporated into woodland management schemes, will not only ensure this species’ survival, but that of a wide suite of other deadwood specialists.

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### Acknowledgements


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### Table 1: Summary of nest characteristics of *F. sanguinea* at Bennachie.

<table>
<thead>
<tr>
<th>Nest</th>
<th>Location</th>
<th>Slope</th>
<th>Age of stump (years)</th>
<th>Stump diameter (cm)</th>
<th>Mean vegetation height (m)</th>
<th>Free drift (m)</th>
<th>Dominant host species</th>
<th>No. of host nests</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NE</td>
<td>5</td>
<td>0.44</td>
<td>0.46</td>
<td>0.46</td>
<td>0.04</td>
<td><em>F. lemani</em></td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>SE</td>
<td>5</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
<td>0.04</td>
<td><em>F. lemani</em></td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>NE</td>
<td>5</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.04</td>
<td><em>F. lemani</em></td>
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</tr>
<tr>
<td>4</td>
<td>SW</td>
<td>5</td>
<td>0.46</td>
<td>0.46</td>
<td>0.46</td>
<td>0.04</td>
<td><em>F. lemani</em></td>
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